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Credit Concentration Risk in the Indian Banking Industry

Mihir Dash*, Bhavna Ranjan Ahuja**

Abstract

Risk concentration has arguably been the single most important cause of major problems in banks. Banks should be particularly attentive to identifying credit risk concentrations and ensuring that their effects are adequately assessed. There have been many instances where large borrowers have caused sizable losses to many banks and jeopardized the health of many financial institutions. The current study attempts to compare and contrast the levels of concentration risk in the Indian banking industry in terms of concentration of deposits, advances, exposures and NPAs in the period 2010-2014, and to study the relationship between concentration risk and NPAs of the banks in the Indian scenario along with its relationship of concentration levels with age, return on net worth (RONW), capital adequacy ratio (CAR, Cost of Borrowings and Cost of Deposits.

Keyword: Credit Risk Concentration, Correlated Defaults, Indian Banking Industry, Deposits, Advances, Exposures and NPAs

1. Introduction

Risk concentration is the single most important cause of major problems faced by the banks. Banks should pay particular attention in identifying credit risk concentrations and ensuring that their effects are very well taken care off.. There have been many instances where large borrowers such as Enron, Worldcom, and Parmalat have caused sizable losses to many banks. The agricultural loans in US Midwest, oil loans in Texas, East Asian Crisis, and the recent US mortgage crisis are examples of correlated defaults that jeopardized the health of many financial institutions (BCBS, 2006; Deutsche Bundesbank, 2006; Bandyopadhyay, 2010). All these examples illustrate the importance of measuring concentration risk in credit portfolios of banks.

As per Basel Committee on Banking Supervision (BCBS, 2005) and RBI Master Circular (2013), there are majorly three categories of bank risk – Credit Risk, Market Risk, and Operational Risk. Credit risk is defined as the potential that a bank borrower or counterparty will fail to meet its obligations in accordance with agreed terms. Market Risk is defined as the risk of losses in on-balance sheet and off-balance sheet positions arising from movements in market prices. Operational risk is defined as the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events.

Apart from the above three major types of bank risks, the Basel Committee also identified Liquidity Risk, Interest Risk, and 'Other' Risk (i.e. reputational and strategic risk). Several other types of risks have also been identified in different studies. Raghavan (2003) suggested that bank risk comprises of Credit Risk, Market Risk (comprising of liquidity risk, interest rate risk, forex risk, and country risk), Operational Risk, Regulatory Risk and Environmental Risk. Further, the literature classifies various types of credit risks. The various categories of credit risk include sovereign risk, country risk, legal or force majeure risk, marginal risk, and settlement risk (RBI Master Circular, 2013). Raghavan (2003) suggested that Credit Risk is generally made up of transaction risk or default risk and portfolio risk. The portfolio risk in turn comprises of intrinsic and concentration risk. Rekha

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(2005) classified the various components of credit risk in a bank portfolio as Transaction Risk, Intrinsic Risk and Concentration Risk. A Report by Deutche Bundesbank (2006) also identified concentration risk as one of the most important components of Credit Risk in banks.

The Indian banking landscape has changed considerably over the last five decades . The landmark changes in Indian banking can be divided into three phases: bank nationalization of 1969, economic and banking sector reforms in the early 1990's, and high growth phase of the 2000's. The banking sector in India has undergone significant transformation since the financial sector reforms of 1990s. These reforms have increased the profitability and soundness of the Indian banking sector in terms of better risk management practices, disclosures and effective implementation of prudential and regulatory norms.

The organized banking sector in India comprises of Scheduled and Non-Scheduled banks. A Scheduled bank is a bank that is listed under the Second Schedule of the RBI Act, 1934. Scheduled banks are further classified into commercial and cooperative banks. In this paper, our purview of the study is limited to the Scheduled Commercial Banks which account for the major portion of business of the Indian banking sector.

Scheduled Commercial Banks in India are further classified into five categories on the basis of their ownership and nature of operations. Table 1 presents a brief profile of these five categories of banks.

Table 1: Profile of Indian Banking

Particulars	*SBI and its Associates*	*Nationalised Banks*	*New Private Sector Banks*	*Old Private Sector Banks*	*Foreign Banks*
No. of banks	6	20	7	13	43
Deposits (Rs crores)	1,618,445	4,127,252	1,021,939	373,896	287,999
Investments (Rs crores)	472,998	1,286,108	491,607	134,499	228,063
Advances (Rs crores)	1,379,224	3,093,550	873,311	269,937	263,680
Interest income (Rs crores)	163,768	391,109	126,559	39,927	42,249
Interest expended (Rs crores)	106,533	281,396	79,273	27,860	18,741
Net Interest Margin	2.98	2.39	3.30	2.94	3.89
Cost of Funds	5.96	6.39	5.77	7.27	4.05
Return on Equity (%)	15.29	12.34	16.51	16.22	11.52
Return on Assets (%)	0.88	0.74	1.74	1.26	1.94
CRAR (%)	12.67	12.26	17.52	13.73	17.88
Net NPA ratio (%)	2.04	2.00	0.45	0.77	1.01

Source: Profile of Banks, RBI as on Sep 30, 2013 for FY 2012–2013

While understanding the Indian banking sector, it is very important to understand the degree of concentration that exists in the Indian banking sector from various perspectives, viz. the ownership, geographical and industrial perspectives. Figures 1 and 2 show the bank-group-wise concentration of Deposits and Credit as on March 31, 2013.

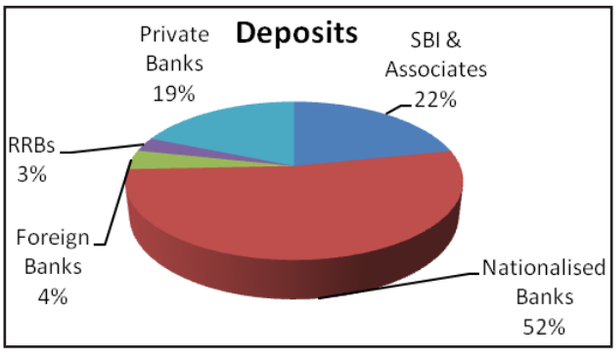

Figure 1: Group Wise Concentration of Deposits (as on March 31, 2013)

Source: Data compiled from RBI Annual Publications-Basic Statistical Returns

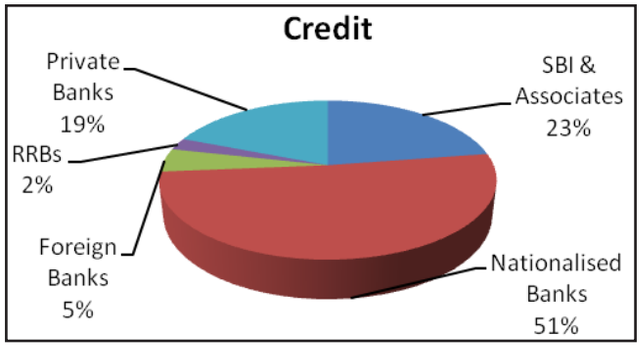

Figure 2: Group wise Concentration of Credit (as on March 31, 2013)

Source: Data compiled from RBI Annual Publications-Basic Statistical Returns

From Figure 1, Nationalised banks (52%) account for more than 50% of the total deposits in the banking system, followed by SBI and its associates (22%), which reflects upon the confidence people attribute to the nationalized banks and SBI and its associates. Another reason is the outreach of these banks. Also, some of the private sector banks are relatively new as compared to the nationalized banks and SBI and its associates. A similar trend can also be observed in case of concentration of credit; again, nationalized banks (51%) have the major share.

Figures 3 and 4 show the geographical concentration of deposits and credit as on March 31, 2013.

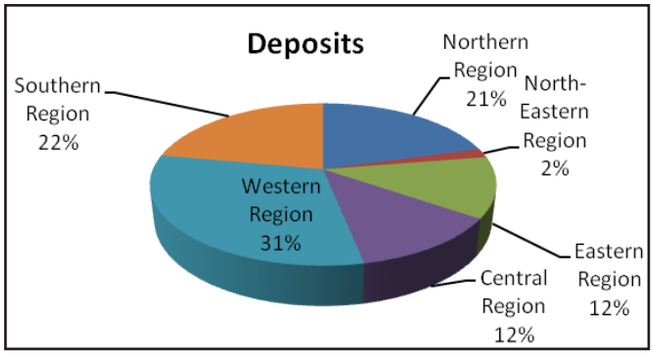

Figure 3: Geographical Concentration of Deposits (as on March 31, 2013)

Source: Data compiled from RBI Annual Publications-Basic Statistical Returns

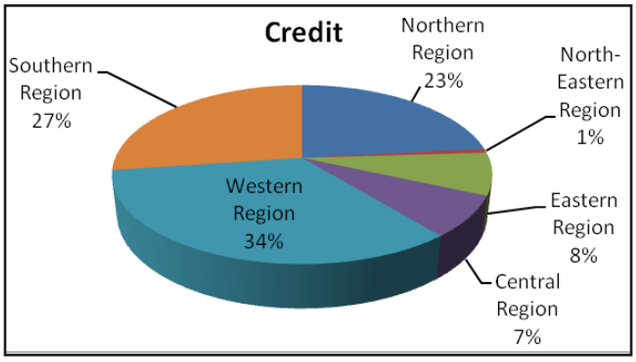

Figure 4: Geographical Concentration of Credit (as on March 31, 2013)

Source: Data compiled from RBI Annual Publications-Basic Statistical Returns

From Figure 3 and 4, the western region contributes to the maximum concentration in terms of both deposits (31%) and credit (34%), followed by Southern region with deposits (22%) and credit (27%). The major state that contributes to concentration in Western region is Maharashtra and in Southern Region is Andhra Pradesh. The least contributor in both deposits and credit is North Eastern region. The main reason for this difference in concentration levels is the levels of economic activity in these regions. Table 1 in Annexure provides the state-wise break-up of deposits and credits.

Figure 5 shows the industrial sector-wise concentration of outstanding advances for the FY 2013–14.

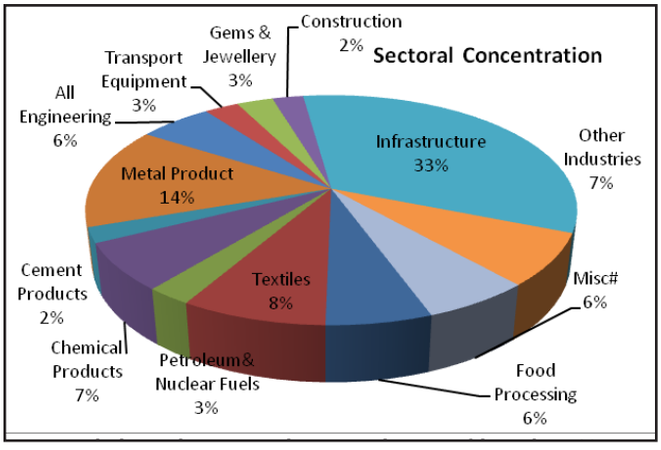

Figure 5: Sectoral Concentration of Outstanding Advances for FY 2013–14

Misc includes industries with a contribution of less than 2% namely Mining & Quarrying, Beverage & Tobacco, Leather & Leather Products, Wood and Wood products, Paper & paper products, Rubber & Plastic, Glass.

From Figure 5, infrastructure (33%) contributes to the maximum concentration of outstanding advances, followed by metal products (14%), and textiles (8%). These are all capital-intensive industries and require huge amounts of bank finance. Table 2 in the Annexure provides the breakup of outstanding advances in detail.

2. Literature Review

Concentration risk is one of the most important types of credit risk. However, research based on Concentration Risk as compared to other categories of risk is still in its development stage. The below section provides a brief overview of the literature available on Credit Concentration Risk.

Concentration Risk has been defined in various ways in the scientific literature. The Basel Committee has defined Concentration Risk as "… any single exposure or a group of exposures with the potential to produce losses large enough (relative to a bank's capital, total assets, or overall risk level) to threaten a bank's health or ability to maintain its core operations" (BCBS, 2004). Concentration risk can be considered from either a macro- (systemic) or a micro- (idiosyncratic) perspective. From the point of view of macro-perspective, the focus is on risks for groups of banks in a country, and from the micro-perspective, it relates to the lending done by the banks which is concentrated either borrower-wise or sector-wise (Deutche Bundesbank Monthly Report, 2006).

Most of the studies focus mainly on two types of concentration risk in credit portfolios, or in other words two types of imperfect diversification. The first type, name concentration (or low granularity), relates to imperfect diversification of idiosyncratic risk in the portfolio either because of its small size or because of large exposures to specific individual obligors. It implies uneven distribution of bank loans to individual borrowers. The second type, sector concentration, relates to imperfect diversification across systematic components of risk, namely sectoral factors. It implies uneven distribution of bank loans to a single or to several highly correlated sectors or geographical regions (BCBS, 2006; Deutche Bundesbank Monthly Report, 2006; Düllmann and Masschelein, 2006; Valvonis et al, 2009; Figini and Uberti, 2010).

As per Deutche Bundesbank Monthly Report (2006), Concentration risk not only exists in the credit portfolios but is also inherent in the area of operational risk, for example dependence on a particular IT system, or bank's liquidity risk in terms of concentration in the funds providers or in market risk in terms of concentration of currencies. Another more inclusive understanding of concentration risk suggests that concentration risk might arise from large credits to single borrower, related borrowers, borrowers having high risk ratings, borrowers from the same country, geographic region, economic sector, the same type of collateral, maturity, currency of denomination, the same type of credit product, and so on (Valvonis et al, 2009). Reynolds (2009) suggests that it is not only important to calculate the name concentration and sector concentration, it is equally important to assess the impact of the interactions between these two types of risks.

Several studies have been done in the area of both Single Name and Sectoral Concentration. The studies conducted on Single Name concentration in banking industry include studies by Deutsche Bundesbank (2006), Kim and Lee (2007), and Valvonis et al (2010). The Sectoral Concentration studies include studies by Deutsche Bundesbank (2006), Duellmann and Masschelein (2006) and Skridulytė and Freitakas (2012).

Credit Risk measurement has evolved dramatically in the last twenty years due to increase in the number of bankruptcies. The earlier approaches to concentration risk analysis were based on (a) Subjective analysis – experts' opinion as to a maximum percent of loans to allocate to an economic sector or geographic location e.g. an SIC code or Latin America, (b) Exposure as a certain percent of capital (e.g. 10%), and (c) Migration Analysis measuring transition how a borrower will change its credit worthiness within the given time horizon. The modern approaches include Modern Portfolio Theory (MPT) to generate SIC sector loans (Altman and Saunders, 1998).

Kim and Lee (2007) provide a simulation-based approach for calculating the concentration risk. They have classified two types of approaches for calculating the Concentration Risk. The first type of approach is to adopt indices of concentration such as Gini coefficient or Herfindahl-Hirschman Index (HHI). The second approach is granularity adjustment. According to the authors, the indices approaches are easier to calculate, however methods like HHI do not provide the complete information. Similarly, the granularity adjustment approach has huge data requirement and difficult to implement.

Langrin and Roach (2009) have classified the following concentration measures to determine the degree of concentration of banks' loan portfolios. The traditional concentration measures are the Hirschman-Herfindahl

Index (HHI) and the Gini coefficient. The distance measures used include Maximum absolute difference (DM1), normalised sum of absolute differences (DM2), normalised sum of squared differences (DM3), average relative difference (DM4) and average squared relative difference (DM5).

Contemporarily, Skridulytė and Freitakas (2012) discussed four types of measures of concentration risk: a) Herfindahl-Hirshman Index (HHI) b) The Gini Coefficient c) Distance measures d) Multi Factor models.

In the preceding section, several measurement of credit concentration in the banks' portfolio have been discussed, of which the Herfindahl-Hirshman Index (HHI) is one of the most extensively used and popular measure of concentration risk. Apart from measurement methods, a number of studies have been conducted in different parts of the world based on concentration risk from different perspectives.

Deutche Bundesbank report (2006) highlights concentration risk in the German banking sector, and observes that though HHI is an effective method of calculating concentration risk, granularity adjustment should also be taken care of as it impacts the economic capital. Düllmann and Masschelein (2006) analysed how concentration in credit portfolios can increase the economic capital in the context of the German banking industry. Langrin and Roach (2009) studied relationship between the concentration risk and the bank returns for the Jamaican Banking industry, and found that greater diversification does not necessarily lead to higher bank returns. Reynolds (2009) has taken a sample of international portfolios of 500 publicly traded and rated companies to illustrate various techniques for measuring, assessing and presenting concentration risk, observing that the use of any single measure or representation can be misleading when analyzing concentration. Skridulytė and Freitakas (2012) analyzed sectorial credit risk concentration of the loan portfolio of Lithuanian banking sector, and found that concentration has decreased in the Lithuanian banking sector during the period 2004-10. Ávila et al (2012) compared the estimates of concentration based on HHI in aggregate data with the actual index for the Mexican banking industry, and concluded that concentration measures should be computed based on aggregate data. Akomea and Adusei (2013) studied concentration in Ghana banking industry, and found that concentration levels have reduced considerably in Ghana and analyzed the impact of consolidation of banks on the concentration levels.

A few researchers have also made an attempt to establish relationship of Concentration Risk with other variables such as concentration risk and NPA levels, bank returns, economic capital, and so on. Rekha (2006) found a strong positive relationship between occupation-wise and industry-wise concentration-index and NPAs level at the aggregate level. Langrin and Roach (2009) suggested that greater diversification does not imply greater bank returns. While studying the influence of concentration on the economic capital, researchers suggested that ignoring the impact of sectoral concentration can lead to a significantly different (sometimes higher and sometimes lower) assessment of economic capital (BCBS, 2006; Duellmann and Masschelein, 2006).

2.1 Concentration Risk in Indian Context

The Reserve Bank of India in its recent ICAAP circular has advised the banks to fix limits on their exposure to specific industry or sectors and has prescribed regulatory limits on banks' exposure to individual and group borrowers in India. As per RBI Master Circular (2013), the credit concentration risk calculations shall be performed at the counterparty level (i.e., large exposures), at the portfolio level (i.e., sectoral and geographical concentrations) and at the asset class level (i.e., liability and assets concentrations).

In the Indian context, a few studies have been conducted in this area. Rekha (2006) attempted to quantify the relationship between concentration risk and NPAs through correlation; however, the paper discussed the overall risk management of Indian banks and did not focus specifically on concentration risk. Sharma and Bal (2010) examined the changes in the concentration of Indian Banking sector from 1990–91 to 2008–09. Bandhopadhyay (2010) analyzed the credit portfolio composition of a large and medium sized leading public sector bank in India to understand the nature and dimensions of credit concentration risk and measure its impact on bank capital.

3. Research Methods and Procedures

Based on the literature review, it is observed that many studies on concentration risk have been done in context of various countries; however, in the Indian context, the measurement and analysis of concentration risk as an important category of credit risk is still in its nascent stage. It has not yet been widely investigated. A few studies have been done on concentration risk in the Indian context.

However, these studies are also not very comprehensive and inclusive.

The disclosure of concentration risk has also been made mandatory in its current form since 2010, hence not much analytical research in the Indian context is available in this area; although industry wise exposure has been available from quite some time but again there is no uniform reporting format for the banks. Moreover, there is no comparative analysis between the Indian public sector and private sector banks in terms of concentration. Also, we can see that a lot of studies have been done wherein the concentration risk is being calculated through traditional methods as well as granular adjustment methods in this context in different countries. In a few papers, Herfindahl-Hirschman Index and Gini coefficient have been used to measure concentration risk (Kim and Lee, 2007; Langrin and Roach, 2009; Ávila et al, 2012; Skridulytė and Freitakas, 2012). Again, very few studies have been done in the Indian context.

Based on the above literature review and the gap in the existing literature, an attempt is made to understand the below dimensions of the research area:

- To compare and contrast the levels of concentration risk in the Indian banking industry in terms of concentration of deposits, advances, exposures and NPAs for last 5 years (FY 2010–2014).
- To study the relationship between concentration risk and NPAs of the banks in the given sample in the Indian scenario along with its relationship of concentration levels with age, RONW, CRAR, Cost of Borrowings and Cost of Deposits.

Research Methodology: The following research methodology has been adopted in conducting research on analyzing the concentration risk in the Indian banking industry.

Scope of study: An attempt was made to take a sample of Indian banks in each category. The categorization of the Indian banking sector has been done as per 'Profile of banks' as on Sep 30, 2013 from RBI website. As per the 'Profile of banks', there are 46 banks in the below mentioned categories. We have taken 42 banks for our study. As the data for one Associate of SBI (viz. State Bank of Mysore) and three old Private Sector Banks (viz. Catholic Syrian Bank, Nainital Bank, Tamilnad Mercantile Bank) was not available in their respective Balance Sheets, these banks have been excluded from the analysis. Table 2 provides the list of banks covered in the study.

Table 2: Banks Covered in the Study

Bank category	*No. of banks*	*Sample Size*	*Sample*
SBI and Associates	6	5	State Bank of India State Bank of Travancore State Bank of Bikaner and Jaipur State Bank of Hyderabad State Bank of Patiala
Old Private Sector Banks	13	10	J & K Bank Federal Bank ING Vyasa Bank South Indian Bank Karur Vyasa Bank Karanataka Bank City Union Bank Lakshmi Vilas Bank Dhanlakhmi Bank Ratnakar Bank
New Private Sector Banks	7	7	ICICI Bank HDFC Bank Axis Bank Yes Bank Kotak Mahindra Bank Indus Ind Bank DCB bank

Nationalized Banks	20	20	Bank of Baroda Punjab National Bank Bank of India Canara Bank Union Bank IDBI Bank Central Bank Indian Overseas Bank Syndicate Bank Allahabad Bank Oriental Bank of Commerce UCO Bank Corporation Bank Indian Bank Andhra Bank Bank of Maharashtra Bank United Bank of India Dena Bank Vijaya Bank Punjab and Sind Bank
Total	46	42	

Sources of Information: This study is based on the secondary sources of information. The numerical data has been mainly collected from the annual reports of the banks, RBI publications and Capitaline database.

Period of Study: RBI has made it mandatory for all the banks to disclose concentration risk disclosures from 2010. Hence the study has been conducted for last five years, from FY 2009--2010 to FY 2013- 2014.

Research Methods: Based on the above objectives, Section 4.1 presents the descriptive statistics of the variables mentioned in Table 3 below. Section 4.2 presents the analysis of the aggregate concentration levels of deposits, advances, exposures and NPAs for all categories of the banks along with the best and worst performing bank in each category. In Section 4.3, we show the correlation between concentration and other variables.

Table 3: Description of Variables

Variable	*Source*	*Description*
Concentration Of Deposits (%age)	Annual Reports of banks	Percentage of deposits to twenty largest depositors to total deposits
Concentration Of Advances (%age)		Percentage of advances to twenty largest borrowers to total advances
Concentration Of Exposures (%age)		Percentage of exposures of twenty largest borrowers/ customers to total advances
Concentration Of NPAs (Rs in crs)		Total exposure to top four NPA accounts
Return On Net Worth (%age)	Capitaline	(Adjusted Net Profit - Preference dividend)/ Equity paid up + Reserves)*100
Capital Adequacy Ratio (%age)	RBI-Statistical Tables related to Banking in India	Compiled from RBI website as taken from the published annual accounts of banks
Net NPAs to Net Advances (%age)		
Cost of Deposits (%age)		Interest on deposits/Average Deposits (for current and previous year)*100
Cost of Borrowings (%age)		Interest on RBI/inter-bank borrowings + Others)/Average Borrowings (for current and previous year)*100

4. Data Analysis

The data from the sample banks was analyzed and the main results and findings are discussed below:

4.1 Descriptives

Table 4 below presents the descriptive statistics for the variables for all the categories of banks taken for the purpose of our study.

Table 4: Descriptive Statistics of Bank Performance Variables

Variable	*Category of Bank*	*Mean*	*Median*	*Max*	*Min.*	*Std. Dev.*
Return On Net Worth (%age)	SBI and Associates	16.60	17.07	19.76	13.72	2.55
	Nationalised Banks	15.40	17.23	19.75	3.79	4.11
	New Private Sector Banks	15.79	18.63	22.86	5.89	5.74
	Old Private Sector Banks	13.42	12.97	22.04	1.95	6.87
	All	15.14	17.05	22.86	1.95	4.97
Capital Adequacy Ratio (%age)	SBI and Associates	12.73	12.61	13.41	12.09	0.50
	Nationalised Banks	12.73	12.76	13.94	11.77	0.57
	New Private Sector Banks	16.64	16.61	19.06	14.19	1.93
	Old Private Sector Banks	15.21	13.83	29.09	11.07	5.05
	All	13.97	13.14	29.09	11.07	2.98
Net NPAs to Net Advances (%age)	SBI and Associates	1.68	1.68	1.97	1.49	0.19
	Nationalised Banks	1.62	1.54	3.01	0.81	0.49
	New Private Sector Banks	0.62	0.35	1.26	0.04	0.49
	Old Private Sector Banks	0.91	0.59	2.52	0.20	0.79
	All	1.29	1.47	3.01	0.04	0.69
Cost of Deposits (%age)	SBI and Associates	6.52	6.72	6.95	5.65	0.53
	Nationalised Banks	6.28	6.35	7.09	4.82	0.52
	New Private Sector Banks	6.25	6.48	7.28	5.22	0.85
	Old Private Sector Banks	7.00	7.17	7.99	5.71	0.76
	All	6.47	6.52	7.99	4.82	0.69
Cost of Borrowings (%age)	SBI and Associates	4.97	4.83	5.90	4.06	0.74
	Nationalised Banks	5.07	4.87	8.53	2.88	1.43
	New Private Sector Banks	6.39	6.06	9.77	4.17	1.99
	Old Private Sector Banks	7.35	6.76	10.57	5.21	1.83
	All	5.82	5.47	10.57	2.88	1.82

Source: As provided in Table 'Description of variables

In terms of the descriptive statistics for Return on Net Worth (RONW), we can say that on an average the highest RONW is of the SBI and its Associates (16.60%) followed by the new Private Sector Banks (15.79%). Taking the individual case, the highest RONW has been noted among the nationalized banks in case of UCO bank (31.60% in FY 2010), however, the main reason for the same was less capital. In FY 2011, UCO issued equity share capital to the tune of Rs 940 crs due to which the Net worth base increased and thus RONW came in line with the peers. The minimum RONW also is in the same category, in case of United Bank of India (-29.12% in FY 2014) due to losses. Hence, the standard deviation is very high in case of nationalized banks. A noteworthy aspect in this is that due to increase in the capital base for almost all the banks due to requirement of Basel norms, the RONW of almost all the banks has reduced considerably in the last 5 years.

While observing the Capital Adequacy Ratio (CAR), all the banks have the CAR greater than 9% as stipulated by RBI. The new private sector banks have a well cushioned

CAR with an average of 16.64%. An important variable to understand here is Net NPA to Net Advances ratio as a means of understanding concentration risk. Here New Private Sector banks perform considerably well with an average of 0.62% because of their stringent credit practices and tight regulatory and supervisory mechanism. In fact. the lowest average Net NPA to Net Advances ratio is as low as 0.04% for Yes Bank compared to the maximum of 3.01% in the category of Nationalised banks as in case of United Bank of India.

Cost of deposits and cost of borrowings are other important variables as we will observe while understanding the correlation between concentration and cost of deposits and borrowings in the further sections. As regards the cost of deposits, almost all banks confirm to the average of around 6% with the new private sector banks and nationalized banks showing the best in the category with an average of 6.25% and 6.28% respectively. However, Cost of borrowings show considerable deviations from the overall average of all the banks wherein SBI and associates show the lowest average of 4.97% and Old Private sector banks with the highest average in the category with 7.35%.

4.2 Analysis of Concentration in Banks

Table 5 below presents the descriptive statistics for the concentration variables for all the categories of banks.

Table 5: Descriptive Statistics of Concentration Variables

Variable	*Category of Bank*	*Mean*	*Median*	*Max*	*Min.*	*Std. Dev.*
Concentration Of Deposits (%age)	SBI and Associates	11.45	11.15	17.13	5.88	4.31
	Nationalised Banks	12.84	11.76	27.02	6.54	4.79
	New Private Sector Banks	17.19	16.85	27.38	8.26	7.01
	Old Private Sector Banks	15.64	14.73	23.80	6.64	6.27
	All	14.07	13.60	27.38	5.88	5.67
Concentration Of Advances (%age)	SBI and Associates	15.99	15.32	19.27	14.87	1.84
	Nationalised Banks	17.65	17.42	27.02	8.53	4.63
	New Private Sector Banks	15.09	14.51	20.08	12.10	2.58
	Old Private Sector Banks	17.77	17.20	27.44	10.65	5.33
	All	17.05	16.36	27.44	8.53	4.31
Concentration Of Exposures (%age)	SBI and Associates	14.94	15.27	16.19	11.85	1.79
	Nationalised Banks	16.29	16.04	24.84	7.63	4.47
	New Private Sector Banks	15.38	15.11	19.54	13.01	2.13
	Old Private Sector Banks	15.77	15.17	25.33	10.83	4.39
	All	15.85	15.57	25.33	7.63	3.83
Concentration Of NPAs (Rs in crs)	SBI and Associates	803.55	406.77	2436.73	329.28	914.81
	Nationalised Banks	644.58	617.61	1358.07	216.71	346.74
	New Private Sector Banks	302.30	151.47	987.33	20.38	349.91
	Old Private Sector Banks	122.30	121.49	204.44	23.77	60.48
	All	482.10	345.33	2436.73	20.38	467.61

Source: As provided in Table 'Description of variables

Concentration of Deposits: An important aspect of deposits in banking is the structure and stability of deposit base. It is because the source of deposits adds to the volatility of funds. Funding of deposits with diversification of sources and maturities enables the banks to avoid any kind of vulnerabilities associated with concentration of funding from few sources. Also, within the deposit structure, some items are inherently more risky than others like huge ticket size corporate deposits and over dependence on these deposits may prone the banks to higher liquidity risks.

In the Indian context, as per RBI regulation, the banks are required to disclose the total deposits of twenty largest depositors and the percentage of deposits to twenty largest depositors to total deposits.

As can be seen from Table 4, the concentration of deposits of twenty largest depositors is maximum in case of New Private sector banks (17.19%) followed by Old Private Sector Banks (15.64%). In fact, the concentration level of the Private sector banks is greater than the average of all the banks taken together. The least concentration of deposits can be attributed to SBI and its associates (11.45%) and thereafter Nationalised banks (12.84%). The main reason can be attributed to a large customer base and the outreach of Public Sector banks. Also, relatively, the public sector banks are older as compared to private sector banks, hence over time the concentration has diluted. Except for SBI and Associates, the maximum concentration level is very high in case of all other categories of banks which is quite alarming and hence should be checked. It may reflect on the overdependence of these banks on a few depositors. An alarming point is the concentration figures for concentration of deposits which are in the range of 35% (Punjab and Sind Bank-FY2011-36.18%; Kotak Mahindra Bank-FY2010-35.23% and Ratnakar Bank-FY2013-35.58%). These figures have reduced over the last 5 years. However, an important aspect is that the private sector banks have made an attempt to improve upon their concentration levels of the deposits by reducing their dependence on few select depositors.

Table 5 exhibits the best performing and worst performing banks in each category along with the average concentration of deposits in the last 5 years (2009-10 to 2013-14).

Table 5: Best and Worst Performing Banks in Concentration of Deposits

Type	*Best performing bank*	*%age*	*Worst performing bank*	*%age*
SBI and Associates	State Bank of India	5.88	State Bank of Hyderabad	17.13
Nationalized Banks	Punjab National Bank	6.54	Punjab and Sind Bank	27.02
New Private Sector Banks	HDFC bank	8.26	IndusInd Bank	27.38
Old Private Sector Banks	Federal Bank	6.64	Dhanlakshmi Bank	23.80

Concentration of Advances: The importance of Concentration of Advances can hardly be overemphasized with cases like Kingfisher and Indian Airlines which have already become NPAs or are on the verge of becoming NPAs. It is very important for us to assess and minimize this category of inherent credit risk and banks should refrain from making higher credit disbursals to a few power players.

Again, in the Indian context RBI has mandated the banks to disclose the total advances to twenty largest borrowers and the percentage of advances to twenty largest borrowers to total advances. Advances include the credit exposure of the banks (both fund based and non fund based limits) including derivatives as furnished in the RBI Master Circular on Exposure Norms dated July 1, 2010.

As can be seen from the Table 4, the maximum concentration of advances can be observed in the category of Old Private sector banks (17.77%) followed by Nationalised banks (17.65%). The least concentration levels can be observed in the category of new private sector banks (15.09%). If we observe year wise trend, the concentration levels were particularly high in 2010 with an average of 19.97% for all the banks taken together.

Table 6 exhibits the best performing and worst performing banks in this category along with the average concentration of advances in the last 5 years (2009-10 to 2013-14).

Table 6: Best and Worst Performing Banks in Concentration of Advances

Type	*Best performing bank*	*%age*	*Worst performing bank*	*%age*
SBI and Associates	State Bank of India	15.14	State Bank of Hyderabad	19.27
Nationalised Banks	Bank of India	8.53	Corporation Bank	27.02
New Private Sector Banks	Axis Bank	12.10	IndusInd Bank	20.08
Old Private Sector Banks	City Union Bank	10.65	Ratnakar Bank	27.44

Concentration of Exposures: The banks are required to disclose the total exposure to the top twenty largest borrowers/customers and the percentage of exposures of twenty largest borrowers/customers to total advances. Exposures include credit and investment exposure as furnished in the RBI Master Circular on Exposure Norms dated July 1, 2010. With context to Concentration of Exposures, again SBI and its associates have the least concentration levels (14.94%) and maximum concentration levels can be seen in the case of Nationalised banks (16.29%).

Table 7 exhibits the best performing and worst performing banks in this category along with the average concentration of exposures in the last 5 years (2009-10 to 2013-14).

Table 7: Best and Worst Performing Banks in Concentration of Exposures

Type	*Best performing bank*	*%age*	*Worst performing bank*	*%age*
SBI and Associates	State Bank of Hyderabad	11.85	State Bank of Travancore	16.19
Nationalised Banks	Bank of India	7.63	Corporation Bank	24.84
New Private Sector Banks	Axis Bank	13.01	IndusInd Bank	19.54
Old Private Sector Banks	Karnataka Bank	10.83	Ratnakar Bank	25.33

Concentration of NPAs: The levels of NPAs in the banking sector have increased at an alarming level in the past few years. The main reason attributed to this rise in NPAs is due to slower economic growth/recession.

NPAs are an important indicator of credit risk and with the increase in concentration of advances, this risk may be enhanced. Hence RBI has made it mandatory for all banks to disclose the total exposure to top four NPA accounts. Table 4 reveals that the concentration of top four NPA accounts is highest in case of SBI and its Associates (Rs 803.53 crs) and the least concentration is in the case of old Private Sector banks (Rs 122.29 crs). In case of analysis of concentration of NPAs, the average figures may not indicate the exact picture as the averages in any particular category are weighed heavily due to a few banks. The high levels of NPAs in case of SBI and Associates is particularly due to SBI wherein the concentration levels are very high with an average of Rs 2436.73 crs. This can also be attributed to the huge asset size of SBI. Similarly, in case of nationalised banks also, the high average is because of two-three banks only.

Table 8 exhibits the best performing and worst performing banks in this category along with the average concentration of NPAs in the last 5 years (2009-10 to 2013-14).

Table 8: Best and Worst Performing Banks in Concentration of NPA

Type	*Best performing bank*	*%age*	*Worst performing bank*	*%age*
SBI and Associates	State Bank Of Travancore	329.28	State Bank of India	2436.73
Nationalised Banks	Dena Bank	216.71	Punjab National Bank	1358.07
New Private Sector Banks	DCB	20.38	ICICI Bank	987.33
Old Private Sector Banks	Ratnakar Bank	23.77	Federal Bank	204.44

In the above section we have observed that there is a difference between the different categories of the banks in terms of concentration. It will be interesting to analyse whether statistically there is any difference among the banks in terms of concentration. For doing the same we will test the below hypothesis:

H_0: There is no significant difference in the concentration levels among the bank groups

H_1: There is significant difference in the concentration levels among the bank groups.

Table 9 exhibits that at 5% significance levels, there is significant difference in case of concentration of deposits, advances and Top 4 NPA accounts.

Table 9: Testing the Difference in Concentration Levels among 4 Categories of Banks

ANOVA	*F stat*	*p-value*
Concentration of deposits (in %age)	7.16	0.00**
Concentration of advances (in %age)	2.63	0.05*
Concentration of exposures (in %age)	.69	0.56
Top 4 NPA accounts (Rs in crores)	14.45	0.00**

**Significant at 5% significance levels*

*** Significant at 1% significance levels*

As we can see, there is a significant difference between the bank groups in case of concentration of deposits (f=7.16, p<.01) and concentration of top 4 NPA Accounts (f=14.45, p<.01).

4.3 Correlation between Concentration Levels and Other Variables

Table 10 shows the correlation matrix among the various variables.

Table 10: Correlation Matrix

	Age	*CD*	*CA*	*CE*	*CNPA*	*RONW*	*NPA:NA*	*CRAR*	*CostD*
CD	-.457**								
CA	.065	.313*							
CE	.037	.391*	.784**						
CNPA	.517**	-.470**	-.164	-.160					
RONW	.069	-.098	-.165	-.152	.014				
NPAtoNA	.397**	-.303	.067	.008	.416**	-.452**			
CRAR	-.371*	.273	.213	.249	-.227	-.147	-.516**		
CostD	.012	.326*	.181	.163	-.498**	-.144	.111	-.038	
CostB	-.199	.111	-.166	-.157	-.416**	-.076	-.157	.088	.388*

*** Correlation is significant at the 0.01 significance level (two-tailed)*

** Correlation is significant at the 0.05 significance level (two-tailed)*

An observation from the results in Table 10 is that there is significant negative correlation between age and concentration of Deposits (r =-.457, p<.01), which means that older banks tend to have lower concentration levels of Deposits than newer banks; and significant positive correlation between age and concentration of NPAs (r =.517, p<.01), which means that older banks tend to have higher concentration levels of NPAs than newer banks. These can be interpreted as *trends.* The former phenomenon could be a result of banks diversifying their customer base over time, while the latter could be a reflection of increased borrowing by older customers over time. The latter phenomenon could also be partly due to priority sector lending by Public Sector Banks, which are typically older than the Private Sector Banks.

Another observation from the results in Table 10 is that concentration levels are closely inter-correlated. The concentration levels are treated as endogenous variables, in the sense that they are a consequence of bank policies and operations. In particular, there is significant positive correlation between concentration of Deposits and concentration of Advances (r =.313, p<.05), significant positive correlation between concentration of Deposits and concentration of Exposures (r =.391, p<.05), significant positive correlation between concentration of Advances and concentration of Exposures (r =.784, p<.01), and significant negative correlation between concentration of Deposits and concentration of NPAs (r =-.470, p<.01). This means that banks with high concentration levels of Deposits tend to also have high concentration levels of

Advances and Exposures, and low concentration levels of NPAs, and vice versa. This suggests that the concentration variables may be grouped together as a single index of concentration.

A final observation from the results in Table 10 relates to correlation between concentration levels and the other variables. Though these variables are not exogenous variables, they may be controlled to some extent through regulations and policies, so that they may be used to control concentration levels. In particular, there is significant positive correlation between concentration of Deposits and cost of Deposits ($r = .326$, $p < .05$), significant positive correlation between concentration of NPAs and ratio of NPAs to NA ($r = .416$, $p < .01$), and significant negative correlation between concentration of NPAs and cost of Deposits ($r = -.498$, $p < .01$) and costs of Borrowing ($r = -.416$, $p < .01$). This suggests that banks with higher costs of Deposits and Borrowings tend to have lower concentration levels of NPAs, and in turn tend to have higher concentration levels of Deposits, Advances, and Exposures. Also, there is significant negative correlation between Capital Adequacy Ratio and ratio of NPAs to NA ($r = -.516$, $p < .01$); thus, banks with higher Capital Adequacy tend to have lower NPA levels, and in turn tend to have lower concentration levels of NPAs and higher concentration levels of Deposits, Advances, and Exposures.

5. Conclusion and Recommendations

Competition in the Indian banking sector has increased manifold due to entry of foreign banks and new bank licenses being granted by RBI. There is a plethora of new bank products and innovative services being offered by banks. However, customers, both depositors and borrowers, should be careful in choosing the banks in terms of risk that arises due to concentration of advances, deposits, exposures and NPAs.

RBI has made it mandatory for banks to disclose the levels of concentration since 2010 and as can be seen from the research above, the concentration levels have reduced considerably over the last four years. High concentration levels can prove detrimental for the banks, especially at times of financial distress. Hence it is very important for the policymakers to recognize credit concentration risk as one of the most important types of risk in light of the big defaults that have surfaced in the last five years and study the impact on the NPA levels of the banks.

The public sector banks need to work on their NPA levels which are increasing at an alarming level. The private sector banks should also diversify their depositor profile as too much dependence on the top twenty depositors makes the banks volatile towards liquidity risk.

The results of the study suggest that a suitable concentration index should be evolved that incorporates the risk associated with high concentration levels. This index would enable regulators to monitor concentration in banks, in order to prevent banks from taking undue concentration risk. The results of the study also suggest that concentration risk may be controlled through policies and regulations, particularly interest rates, affecting the costs of Deposits and Borrowings, and regulations on Capital Adequacy Ratios. However, the results of the study are not conclusive, so that the causal link between these variables needs to be studied more carefully.

6. Limitations and Implications for Future Research

The area of credit concentration risk is still in its nascent stage of research as compared to other forms of risk, especially in context of Indian banking industry as not many papers on credit concentration risk are available. This study provides a platform for further research in this area as it provides an overview of the concept of credit concentration and its relevance in the Indian banking industry.

However, the study has some limitations. Firstly, the study takes into account last five years which may be considered a relatively short period for analysis. However, as RBI has made it mandatory for all banks to disclose the concentration parameters only since FY 2010, hence the study could not be extended beyond. Secondly, there are several indices that capture and analyze concentration risk but due to paucity of data, this has not been possible. Thirdly, the study uses correlation to explore relationships between concentration risk and other variables; however, this does not analyze causality between the same. There is further scope for exploring the causal relationship between concentration risk and other variables, particularly interest rates, Capital Adequacy, and NPA levels.

Also, keeping in view the importance of this subject, an attempt can be made to extend the study to other banks. In order to examine concentration from a micro-perspective, sector-wise concentration should be examined for individual banks. From a macro-perspective, the determinants of concentration risk should be examined; in particular, an interesting possibility is that of a relationship between competition and concentration risk.

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Annexures

Table I: Geographical Concentration of Deposits and Credit as on March 31, 2013

REGION/STATE/UNION TERRITORY	*Amount (Rs in Mn)*	*%age*	*Amount O/s (Rs in Mn)*	*%age*
NORTHERN REGION	14474524.8	20.64%	12860329.8	23.28%
Haryana	1693933.3	2.42%	1296604.6	2.35%
Himachal Pradesh	450185.7	0.64%	157960.6	0.29%
Jammu & Kashmir	593806.6	0.85%	219255.5	0.40%
Punjab	1998103.8	2.85%	1629959.0	2.95%
Rajasthan	1762712.8	2.51%	1631655.6	2.95%
Chandigarh	453917.3	0.65%	578521.6	1.05%
Delhi	7521865.2	10.73%	7346372.8	13.30%
NORTH-EASTERN REGION	1247723.3	1.78%	419333.7	0.76%
Arunachal Pradesh	70113.1	0.10%	15309.0	0.03%
Assam	766802.7	1.09%	285249.5	0.52%
Manipur	51359.3	0.07%	14664.4	0.03%
Meghalaya	136526.2	0.19%	32739.2	0.06%
Mizoram	41476.1	0.06%	14628.2	0.03%
Nagaland	63436.3	0.09%	18019.0	0.03%
Tripura	118009.7	0.17%	38724.5	0.07%
EASTERN REGION	8531738.0	12.17%	4217680.0	7.63%
Bihar	1634911.3	2.33%	498315.7	0.90%
Jharkhand	1040794.0	1.48%	334331.2	0.61%
Odisha	1427606.8	2.04%	661583.9	1.20%
Sikkim	49415.2	0.07%	13454.5	0.02%
West Bengal	4355725.4	6.21%	2701011.4	4.89%
Andaman & Nicobar Islands	23285.3	0.03%	8983.4	0.02%
CENTRAL REGION	8585410.3	12.24%	4083985.3	7.39%
Chhattisgarh	828694.8	1.18%	445966.2	0.81%
Madhya Pradesh	1986210.9	2.83%	1156673.8	2.09%
Uttar Pradesh	5111339.6	7.29%	2251688.1	4.08%
Uttarakhand	659165.1	0.94%	229657.1	0.42%
WESTERN REGION	21819427.7	31.11%	18648435.7	33.75%
Goa	397806.1	0.57%	114701.5	0.21%
Gujarat	3587715.8	5.12%	2612765.7	4.73%
Maharashtra	17788829.0	25.37%	15908597.2	28.79%
Dadra & Nagar Haveli	19738.9	0.03%	7322.9	0.01%
Daman & Diu	25337.8	0.04%	5048.3	0.01%
SOUTHERN REGION	15467379.5	22.06%	15023405.7	27.19%
Andhra Pradesh	3934399.8	5.61%	4406588.6	7.98%
Karnataka	4622234.0	6.59%	3323284.2	6.01%
Kerala	2366984.1	3.38%	1730886.7	3.13%
Tamil Nadu	4455262.8	6.35%	5493443.6	9.94%
Lakshadweep	6184.0	0.01%	611.8	0.00%
Puducherry	82314.8	0.12%	68590.9	0.12%
ALL-INDIA	70126203.6	100.00%	55253170.3	100.00%

Source: RBI Annual Publications

Table II: Sectorial Concentration Advances for FY 2013–2014

Industry	*O/s Advances (Rs Billion)*
Mining & Quarrying (including Coal)	353.26
Food Processing	1479.78
Beverage & Tobacco	185.99
Textiles	2039.98
Leather & Leather Products	102.66
Wood & Wood Products	93.50
Paper & Paper Products	331.40
Petroleum, Coal Products & Nuclear Fuels	634.88
Chemicals & Chemical Products	1676.70
Rubber, Plastic & their Products	368.22
Glass & Glassware	87.11
Cement & Cement Products	541.16
Basic Metal & Metal Product	3619.69
All Engineering	1455.73
Vehicles, Vehicle Parts & Transport Equipment	677.38
Gems & Jewelry	719.68
Construction	614.13
Infrastructure	8397.80
Other Industries	1849.70

Source: RBI Annual Publications